either said metal block or said ceramic substrate not corresponding to at least one of said plurality of semiconductor elements extends entirely over said insulation unit.

B1 cont

4. (Amended) The semiconductor device according to claim 1, wherein said metal block includes a surface having a region larger than a surface of said jointing material on a side opposite to said jointing material, said surface of said jointing material lying on a side opposite to said semiconductor element.

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9. (Amended) The semiconductor device according to claim 6, wherein said metal block includes a surface having a region larger than a surface of said jointing material on a side opposite to said jointing material, said surface of said jointing material lying on a side opposite to said semiconductor element.

REMARKS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-10 are pending in the present application. Claims 3, 4 and 9 have been amended by the present amendment.

In the outstanding Office Action, the specification was objected; Claims 3,4, 9 and 10 were rejected under 35 U.S.C. § 112, second paragraph; Claims 1 and 4 were rejected under 35 U.S.C. § 102(b) as anticipated by Arai et al; Claims 2 and 5 were rejected under 35 U.S.C. § 103(a) as unpatentable over Arai et al; Claims 6-8 were allowed; and Claim 9 was indicated as allowable if rewritten to overcome the rejection under 35 U.S.C. § 112, second paragraph, set forth in the Office Action.

Applicant thanks the Examiner for the indication of allowable subject matter.

Regarding the objection to the specification, according to amended Claim 3, either a metal block or a ceramic substrate is provided to be in corresponding to at least one semiconductor element, and either the metal block or the ceramic substrate not corresponding to at least one semiconductor element extends entirely over the insulation unit. This feature is disclosed in Figs. 7 and 8 and at page 16, lines 2-20 of the present specification.

According to a variation of the first preferred embodiment illustrated in Fig. 7, a metal block 3p on a P side is provided per power element 1p (see page 16, lines 4-7). Further, all power elements 1p on the P side constitute an insulation unit and the insulating substrate 4p is provided extending over the entire insulating unit (see page 16, lines 3 and 4).

Further, according to another variation of the first preferred embodiment illustrated in Fig. 8, the insulating substrate 4p on the P side is provided per power element 1p (see page 16, lines 10-12). Additionally, the metal block 3p on the P side is provided extending over all the power elements 1p constituting an insulation unit (see page 16, lines 8-10).

As stated above, amended Claim 3 is supported by the present specification and drawings, and the structure of the metal block and the ceramic substrate of claim 3 is clearly defined therein.

Regarding the rejection of Claims 3, 4, 9 and 10 under 35 U.S.C. § 112, second paragraph, similar comments apply to Claim 3 as discussed above. According to amended Claims 4 and 9, the metal block includes a surface at an opposite side of the jointing material being larger than a surface of the jointing material at an opposite side of the semiconductor element. This feature is illustrated, for example, in Figs. 3 and 4.

As illustrated in Figs. 3 and 4, a surface of a metal block 3p at an opposite side of a jointing material 9 is larger than a surface of the jointing material 9 at the opposite side of a power element 1p. Therefore, amended Claims 4 and 9 specify which side of a jointing

material is smaller than the surface of the metal block at the opposite side of the jointing material.

Regarding Claim 10, the outstanding Office Action indicates these features are not illustrated in the second embodiment of Fig. 9. However, Applicant notes that Figure 9 illustrates a semiconductor device which basically differs from the semiconductor device according to the first embodiment in that a resin insulating layer 14 is substituted for the insulating substrate 4 (see page 16, line 22 to page 17, line 1). Figure 9 includes the metal block 3 which is also shown in the first embodiment. As Figure 9 uses the same reference numeral as in the first embodiment for the metal block 3, it is clear the metal block including the features shown in Figure 5, for example, apply to both the first and second embodiments. Accordingly, it is respectfully requested this rejection be withdrawn.

Claims 1 and 4 stand rejected under 35 U.S.C. § 102(b) as anticipated by Arai et al This rejection is respectfully traversed.

The outstanding office Action indicates Arai et al teach the semiconductor device as recited in Claim 1 except for the electrode of the semiconductor element and jointing material and cites Fig. 10. However, according to the semiconductor device disclosed in Fig. 10 of Arai et al, a second ceramic substrate 320 is interposed between a second metal plate 330 and a first ceramic substrate 301.

In contrast, according to the semiconductor device recited in Claim 1 of the present invention, because a metal block is jointed to a ceramic substrate having a metal layer on both sides, there is no other ceramic substrate interposed between the metal block and the ceramic substrate.

Therefore, it is respectfully submitted Fig. 10 of Arai et al do not disclose the semiconductor device as recited in Claim 1 of the present invention. Furthermore, Arai et al

do not teach or suggest a technique for jointing the second metal plate 330 and a copper plate 312 on the first ceramic substrate 301 by removing the second ceramic substrate 320.

Claims 2 and 5 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Arai et al. This rejection is respectfully traversed.

Regarding Claim 5 of the present invention, the outstanding Office Action states it would have been obvious to one having ordinary skill in the art that a gap between the metal block and the semiconductor element becomes wider as a distance from a center of the semiconductor element becomes longer because it depends on the amount of heat that is dissipated by the integrated circuit. Although there may be a gap determined by the amount of heat from a semiconductor element, Arai et al do not teach or suggest that the gap determined in such a manner is equal to a gap that becomes wider as a distance from a center of the semiconductor element becomes greater, as recited in Claim 5 of the present invention.

Furthermore, the gap that becomes wider as a distance from a center of the semiconductor element becomes greater as recited in Claim 5 is not determined by the amount of heat, but by the phenomenon that a thermal stress generated at a jointing material becomes stronger as a distance from a center of a semiconductor element becomes greater (see page 13, line 20 to page 14, line 4). Such a phenomenon is neither disclosed nor suggested by Arai et al. Further, Claim 2 depends on Claim 1 and further defines over Arai et al.

Accordingly, it is respectfully request this rejection also be withdrawn.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.

Gregory J. Maier
Attorney of Record
Registration No. 25,599
David A. Bilodeau
Registration No. 42,325

22850

(703) 413-3000
Fax #: (703)413-2220
GJM/DAB/kst

I:\atty\DAB\210096us-am1.wpd

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IN THE CLAIMS

3. (Amended) The semiconductor device according to claim 1, wherein

said semiconductor element includes a plurality of semiconductor elements;

said metal block and said ceramic substrate are separated per insulation unit of at least one of said plurality of semiconductor elements;

[one of] either said metal block [and] or said ceramic substrate is provided to be in corresponding to at least one of said plurality of semiconductor elements; and

[another one of] either said metal block [and] or said ceramic substrate not corresponding to at least one of said plurality of semiconductor elements extends entirely over [all of] said [plurality of semiconductor elements for forming said] insulation unit.

4. (Amended) The semiconductor device according to claim 1, wherein said metal block includes a surface having a region larger than [that] a surface of said jointing material on a side opposite to said jointing material, said surface of said jointing material lying on a side opposite to said semiconductor element.

9. (Amended) The semiconductor device according to claim 6, wherein said metal block includes a surface having a region larger than [that] a surface of said jointing material on a side opposite to said jointing material, said surface of said jointing material lying on a side opposite to said semiconductor element.